PATENT ABSTRACTS OF JAPAN

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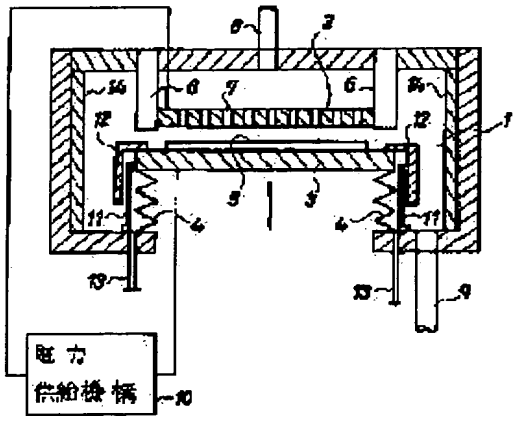
(54) SEMICONDUCTOR PROCESSOR



(57)Abstract:
PURPOSE: To improve the productivity by reducing the cleaning frequency as compared with conventional, shortening the cleaning time, and improving the device working ratio.
CONSTITUTION: At the bottom of a chamber 1, a lower ring member 11 is provided in cylindrical shape to surround bellows mechanism 4. Moreover, an upper ring member 12 is provided to extend from the periphery of a lower electrode 3 and surround the lower ring member 11. These lower ring member 11 and the upper ring member 12 are made of insulating material, and are detachable. Moreover, at the bottom of the chamber 1 between the below mechanism 4 and the lower ring member 11, a gas purge pipe 13 is connected so that inert gas can be purged.

CLAIMS

[Claim(s)]
[Claim 1] The semi-conductor processor characterized by having held the processed material in the chamber, having approached some [at least] front faces of the structure of said chamber inside, having prepared the removable screen in the semi-conductor processor which supplies predetermined raw gas in this chamber, and processes to said processed material, and constituting inert gas possible [a purge] between this screen and said structure front face.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001] [Objects of the Invention]
[0002]
[Industrial Application] This invention relates to a semi-conductor processor.
[0003]
[Description of the Prior Art] From the former, by the production process of a semiconductor device, a processed material, for example, a semi-conductor wafer, is held in a chamber, and the semi-conductor processor which supplies predetermined raw gas in this chamber, and processes to a semi-conductor wafer, for example, a dry etching system, the CVD system, the sputtering system, etc. are used.
[0004] It consists of such semi-conductor processors, for example, a dry etching system, so that the parallel plate electrode, for example, an up electrode, and the lower electrode may be prepared in the chamber, for example, a semi-conductor wafer may be laid on this lower electrode. And while making the inside of a chamber into a predetermined raw gas ambient atmosphere, predetermined high-frequency power is supplied between an up electrode and a lower electrode, and dry etching removes the thin film which was made to generate the plasma and was formed in the front face of a semi-conductor wafer.
[0005]
[Problem(s) to be Solved by the Invention] Since deposition is generated to each part in a chamber, and a deposit once adheres, and this deposit separates, it adheres to a semi-conductor wafer and it becomes the cause of defect generating according to an operation of the plasma etc., it is necessary to clean the inside of a chamber with the semi-conductor processor mentioned above, for example, a dry etching system, frequently. Since it is easy to separate according to the motion, it is necessary to clean frequently especially the deposit adhering to moving part, for example, bellows-like moving part etc. However, since a great effort and time amount are needed for such cleaning, decline in equipment availability is caused and it has become the cause of a productivity slowdown.
[0006] It tends to offer the semi-conductor processor which cleaning time amount can be shortened, and equipment availability can be raised, and can aim at improvement in productivity while this invention coped with this conventional situation, was made and can reduce cleaning frequency compared with the former.
[0007] [Elements of the Invention]
[0008]
[Means for Solving the Problem] That is, the semi-conductor processor of this invention holds a processed material in a chamber, in the semi-conductor processor which supplies predetermined raw gas in this chamber, and processes to said processed material, approaches some [at least] front faces of the structure of said chamber inside, prepares a removable screen, and is characterized by constituting inert gas possible [a purge] between this screen and said structure front face.
[0009]
[Function] The front face of the structure of the chamber inside, for example, bellows-like moving part, is approached, a removable screen is prepared, and it consists of semi-conductor processors of this invention of the above-mentioned configuration possible [a purge of inert gas] between this screen and a structure front face. For this reason, it can prevent that a deposit adheres to bellows-like moving part etc., and

cleaning frequency can be reduced compared with the former. Moreover, since the above-mentioned screen can be removed and exchanged or it can clean by removing, cleaning time amount can be shortened compared with the former.
[0010] Therefore, equipment availability can be raised compared with the former and improvement in productivity can be aimed at.
[0011]
[Example] One example which applied this invention to the dry etching system which performs dry etching of a semi-conductor wafer hereafter is explained with reference to a drawing.
[0012] As shown in drawing 1 , the dry etching system of this example is equipped with the chamber 1 of the shape of a cylinder constituted airtightly possible [lock out] in the interior. That body consists of conductive ingredients (alumite processing has been performed to the front face), for example, aluminum etc., and this chamber 1 is mostly formed in parallel so that the up electrode 2 formed in disc-like and the lower electrode 3 may counter in a chamber 1.
[0013] The bellows device 4 is formed in the lower part of this lower electrode 3 as a hermetic seal device constituted elastically, rise and fall are made free by the vertical-movement device which is not illustrated, and it is constituted possible [modification of spacing with the up electrode 2]. The semi-conductor wafer 5 which is a processed material is laid in the top face of this lower electrode 3. In addition, the refrigerant circulator style for circulating through the cooler style which is not illustrated, for example, a cooling medium, is prepared in this lower electrode 3, and it is constituted so that the semi-conductor wafer 5 can be cooled.
[0014] On the other hand, the up electrode 2 is supported after the configuration member and the electric target of a chamber 1 have insulated from the insulating ingredient, for example, an alumina etc., by the insulating member 6 formed in the shape of a cylinder. Moreover, two or more raw gas runoff holes 7 are formed in this up electrode 2, and the raw gas (etching gas) supplied from the raw gas charging line 8 is made to flow out of these raw gas runoff holes 7 towards the semi-conductor wafer 5 laid on the lower electrode 3, and it is constituted so that it may discharge from the exhaust pipe arrangement 9 connected to the lower part of a chamber 1.
[0015] Moreover, the power feeder style 10 is connected to the above-mentioned up electrode 2 and the lower electrode 3, and it is constituted between the up electrode 2 and the lower electrode 3 possible [supply of predetermined frequency, for example, 13.56MHz high-frequency power,].
[0016] Furthermore, in the dry etching system of this example, as shown also in drawing 2 , the lower ring member 11 formed in the shape of a cylinder so that the perimeter of the bellows device 4 might be surrounded as a screen is formed in the pars basilaris ossis occipitalis of a chamber 1. Moreover, the up ring member 12 is formed so that it may extend caudad from the perimeter of the lower electrode 3 and the perimeter of the above-mentioned lower ring member 11 may be surrounded. These lower ring members 11 and the up ring member 12 consist of an insulating ingredient, for example, the ceramics, Teflon, etc., and are constituted free [attachment and detachment]. Moreover, the gas purge piping 13 is connected to the pars basilaris ossis occipitalis of the chamber 1 between the bellows device 4 and the lower ring member 11, and it is constituted so that gas, such as inert gas, for example, nitrogen, helium, and an argon, can be purged between the bellows device 4 and the lower ring member 11 to drawing 2 , as an arrow head shows.
[0017] Moreover, the above-mentioned lower ring member 11 and the up ring member 12, and the cylindrical member 14 constituted with the same insulating

ingredient are formed free [attachment and detachment] so that the side-attachment-wall section inside of a chamber 1 may be covered.
[0018] In the dry etching system of this example of the above-mentioned configuration, according to the vertical-movement device which is not illustrated, the semi-conductor wafer 5 is carried in in a chamber 1 from carrying-in opening which is not illustrated where the lower electrode 3 is dropped, and it lays on the lower electrode 3.
[0019] Then, the lower electrode 3 is raised and spacing of the up electrode 2 and the lower electrode 3 is set as predetermined spacing.
[0020] While supplying predetermined raw gas (etching gas) from the raw gas charging line 8 and making it flow out of the raw gas runoff hole 7 towards the semi-conductor wafer 5 after an appropriate time, exhaust air is carried out from an exhaust pipe arrangement 9, the inside of a chamber 1 is made into the raw gas ambient atmosphere of a predetermined pressure, and predetermined frequency, for example, 13.56MHz high-frequency power, is supplied between the up electrode 2 and the lower electrode 3 from the power feeder style 10 with this. Then, discharge arises between the up electrode 2 and the lower electrode 3, and dry etching of the thin film with which raw gas was plasma-ized and was formed in the front face of the semi-conductor wafer 5 is performed. At this time, inert gas is simultaneously purged between the bellows device 4 and the lower ring member 11 from the gas purge piping 13.
[0021] Therefore, although deposition is generated and a deposit adheres to each structure with the dry etching of the semi-conductor wafer 5 within a chamber 1, since inert gas is purged, in the part of the bellows device 4 at least, it can prevent that a deposit adheres. Here, if a deposit adheres to this bellows device 4, a deposit exfoliates with telescopic motion of the bellows device 4, it is easy to disperse, and, for this reason, it necessary to clean frequently but, and in this example, since the adhesion of a deposit to the bellows device 4 can be prevented, the frequency of required cleaning can be reduced. In addition, it can be made hard to happen exfoliation of a deposit by forming, for example in the shape of a split face about the exposed part (product made from alumite) of chamber 1 wall.
[0022] Moreover, although a deposit adheres to the lower ring member 11, the up ring member 12, and cylindrical member 14 grade, since these can be removed from a chamber 1, can be exchanged or can be washed easily, they can shorten cleaning time amount compared with the former.
[0023] Furthermore, since the up ring member 12 and the insulating member of cylindrical member 14 grade intervene between the lower electrode 3 and chamber 1 wall, it can prevent that abnormality discharge etc. arises. For this reason, although the above-mentioned example, in addition, explained the example which can also reduce the amount of the deposit by deposition and can also reduce generating of metal contamination and which applied this invention to the dry etching system of the semi-conductor wafer 5, this invention is not limited to this example, and if a CVD system etc. is a semi-conductor processor which the deposit according [for example,] to deposition produces in a chamber, it is applicable [this invention] to any equipments.
[0024]
[Effect of the Invention] As explained above, while being able to reduce cleaning frequency compared with the former according to the semi-conductor processor of this invention, cleaning time amount can be shortened, equipment availability can be raised, and improvement in productivity can be aimed at.

TECHNICAL FIELD

[Industrial Application] This invention relates to a semi-conductor processor.

PRIOR ART

[Description of the Prior Art] From the former, by the production process of a semiconductor device, a processed material, for example, a semi-conductor wafer, is held in a chamber, and the semi-conductor processor which supplies predetermined raw gas in this chamber, and processes to a semi-conductor wafer, for example, a dry etching system, the CVD system, the sputtering system, etc. are used.

[0004] It consists of such semi-conductor processors, for example, a dry etching system, so that the parallel plate electrode, for example, an up electrode, and the lower electrode may be prepared in the chamber, for example, a semi-conductor wafer may be laid on this lower electrode. And while making the inside of a chamber into a predetermined raw gas ambient atmosphere, predetermined high-frequency power is supplied between an up electrode and a lower electrode, and dry etching removes the thin film which was made to generate the plasma and was formed in the front face of a semi-conductor wafer.

EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, while being able to reduce cleaning frequency compared with the former according to the semi-conductor processor of this invention, cleaning time amount can be shortened, equipment availability can be raised, and improvement in productivity can be aimed at.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Since deposition is generated to each part in a chamber, and a deposit once adheres, and this deposit separates, it adheres to a semi-conductor wafer and it becomes the cause of defect generating according to an operation of the plasma etc., it is necessary to clean the inside of a chamber with the semi-conductor processor mentioned above, for example, a dry etching system, frequently. Since it is easy to separate according to the motion, it is necessary to clean frequently especially the deposit adhering to moving part, for example, bellows-like moving part etc. However, since a great effort and time amount are needed for such cleaning, decline in equipment availability is caused and it has become the cause of a productivity slowdown.

[0006] It tends to offer the semi-conductor processor which cleaning time amount can be shortened, and equipment availability can be raised, and can aim at improvement in productivity while this invention coped with this conventional situation, was made and can reduce cleaning frequency compared with the former.

[0007] [Elements of the Invention]

MEANS

[Means for Solving the Problem] That is, the semi-conductor processor of this invention holds a processed material in a chamber, in the semi-conductor processor which supplies predetermined raw gas in this chamber, and processes to said processed material, approaches some [at least] front faces of the structure of said chamber inside, prepares a removable screen, and is characterized by constituting inert gas possible [a purge] between this screen and said structure front face.

OPERATION

[Function] The front face of the structure of the chamber inside, for example, bellows-like moving part, is approached, a removable screen is prepared, and it consists of semi-conductor processors of this invention of the above-mentioned configuration possible [a purge of inert gas] between this screen and a structure front face. For this reason, it can prevent that a deposit adheres to bellows-like moving part etc., and cleaning frequency can be reduced compared with the former. Moreover, since the above-mentioned screen can be removed and exchanged or it can clean by removing, cleaning time amount can be shortened compared with the former.

[0010] Therefore, equipment availability can be raised compared with the former and improvement in productivity can be aimed at.

EXAMPLE

[Example] One example which applied this invention to the dry etching system which performs dry etching of a semi-conductor wafer hereafter is explained with reference to a drawing.

[0012] As shown in drawing 1 , the dry etching system of this example is equipped with the chamber 1 of the shape of a cylinder constituted airtightly possible [lock out] in the interior. That body consists of conductive ingredients (alumite processing has been performed to the front face), for example, aluminum etc., and this chamber 1 is mostly formed in parallel so that the up electrode 2 formed in disc-like and the lower electrode 3 may counter in a chamber 1.

[0013] The bellows device 4 is formed in the lower part of this lower electrode 3 as a hermetic seal device constituted elastically, rise and fall are made free by the vertical-movement device which is not illustrated, and it is constituted possible [modification of spacing with the up electrode 2]. The semi-conductor wafer 5 which is a processed material is laid in the top face of this lower electrode 3. In addition, the refrigerant circulator style for circulating through the cooler style which is not illustrated, for example, a cooling medium, is prepared in this lower electrode 3, and it is constituted so that the semi-conductor wafer 5 can be cooled.

[0014] On the other hand, the up electrode 2 is supported after the configuration member and the electric target of a chamber 1 have insulated from the insulating ingredient, for example, an alumina etc., by the insulating member 6 formed in the shape of a cylinder. Moreover, two or more raw gas runoff holes 7 are formed in this up electrode 2, and the raw gas (etching gas) supplied from the raw gas charging line 8 is made to flow out of these raw gas runoff holes 7 towards the semi-conductor

wafer 5 laid on the lower electrode 3, and it is constituted so that it may discharge from the exhaust pipe arrangement 9 connected to the lower part of a chamber 1.
[0015] Moreover, the power feeder style 10 is connected to the above-mentioned up electrode 2 and the lower electrode 3, and it is constituted between the up electrode 2 and the lower electrode 3 possible [supply of predetermined frequency, for example, 13.56MHz high-frequency power,].
[0016] Furthermore, in the dry etching system of this example, as shown also in drawing 2 , the lower ring member 11 formed in the shape of a cylinder so that the perimeter of the bellows device 4 might be surrounded as a screen is formed in the pars basilaris ossis occipitalis of a chamber 1. Moreover, the up ring member 12 is formed so that it may extend caudad from the perimeter of the lower electrode 3 and the perimeter of the above-mentioned lower ring member 11 may be surrounded. These lower ring members 11 and the up ring member 12 consist of an insulating ingredient, for example, the ceramics, Teflon, etc., and are constituted free [attachment and detachment]. Moreover, the gas purge piping 13 is connected to the pars basilaris ossis occipitalis of the chamber 1 between the bellows device 4 and the lower ring member 11, and it is constituted so that gas, such as inert gas, for example, nitrogen, helium, and an argon, can be purged between the bellows device 4 and the lower ring member 11 to drawing 2 , as an arrow head shows.
[0017] Moreover, the above-mentioned lower ring member 11 and the up ring member 12, and the cylindrical member 14 constituted with the same insulating ingredient are formed free [attachment and detachment] so that the side-attachment-wall section inside of a chamber 1 may be covered.
[0018] In the dry etching system of this example of the above-mentioned configuration, according to the vertical-movement device which is not illustrated, the semi-conductor wafer 5 is carried in in a chamber 1 from carrying-in opening which is not illustrated where the lower electrode 3 is dropped, and it lays on the lower electrode 3.
[0019] Then, the lower electrode 3 is raised and spacing of the up electrode 2 and the lower electrode 3 is set as predetermined spacing.
[0020] While supplying predetermined raw gas (etching gas) from the raw gas charging line 8 and making it flow out of the raw gas runoff hole 7 towards the semi-conductor wafer 5 after an appropriate time, exhaust air is carried out from an exhaust pipe arrangement 9, the inside of a chamber 1 is made into the raw gas ambient atmosphere of a predetermined pressure, and predetermined frequency, for example, 13.56MHz high-frequency power, is supplied between the up electrode 2 and the lower electrode 3 from the power feeder style 10 with this. Then, discharge arises between the up electrode 2 and the lower electrode 3, and dry etching of the thin film with which raw gas was plasma-ized and was formed in the front face of the semi-conductor wafer 5 is performed. At this time, inert gas is simultaneously purged between the bellows device 4 and the lower ring member 11 from the gas purge piping 13.
[0021] Therefore, although deposition is generated and a deposit adheres to each structure with the dry etching of the semi-conductor wafer 5 within a chamber 1, since inert gas is purged, in the part of the bellows device 4 at least, it can prevent that a deposit adheres. Here, if a deposit adheres to this bellows device 4, a deposit exfoliates with telescopic motion of the bellows device 4, it is easy to disperse, and, for this reason, it necessary to clean frequently but, and in this example, since the adhesion of a deposit to the bellows device 4 can be prevented, the frequency of required cleaning can be reduced. In addition, it can be made hard to happen

exfoliation of a deposit by forming, for example in the shape of a split face about the exposed part (product made from alumite) of chamber 1 wall.
[0022] Moreover, although a deposit adheres to the lower ring member 11, the up ring member 12, and cylindrical member 14 grade, since these can be removed from a chamber 1, can be exchanged or can be washed easily, they can shorten cleaning time amount compared with the former.
[0023] Furthermore, since the up ring member 12 and the insulating member of cylindrical member 14 grade intervene between the lower electrode 3 and chamber 1 wall, it can prevent that abnormality discharge etc. arises. For this reason, although the above-mentioned example, in addition, explained the example which can also reduce the amount of the deposit by deposition and can also reduce generating of metal contamination and which applied this invention to the dry etching system of the semi-conductor wafer 5, this invention is not limited to this example, and if a CVD system etc. is a semi-conductor processor which the deposit according [for example,] to deposition produces in a chamber, it is applicable [this invention] to any equipments.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing showing the configuration of the dry etching system of one example of this invention.
[Drawing 2] It is drawing showing the important section configuration of the dry etching system of drawing 1 .
[Description of Notations]
1 Chamber
2 Up Electrode
3 Lower Electrode
4 Bellows Device
5 Semi-conductor Wafer
6 Insulating Member
7 Raw Gas Runoff Hole
8 Raw Gas Charging Line
9 Exhaust Pipe Arrangement
10 Power Feeder Style
11 Lower Ring Member
12 Up Ring Member
13 Gas Purge Piping
14 Cylindrical Member